

HICAHS NEWS

Summer 2003

I write with great enthusiasm to introduce you to the new HICAHS Newsletter! As former Director of a sister NIOSH Agricultural Health and Safety Center, I always thought that the High Plains Intermountain Center for Agricultural Health and Safety provided a great model for others throughout the nation. Since joining HICAHS in 2001, I have been greatly impressed by the creative, energetic staff and many community partners who dedicate themselves to improving the well being of agricultural workers and their families in this region. The past few years have brought a number of harsh challenges, including drought, fire, economic downturn, and increased concern for chemical/biological safety. These challenges have also brought about new opportunities to reinforce old partnerships, build new relationships, and to develop creative approaches to solve these problems. I want to thank the members of our Regional Advisory Board, some of long standing, others new, for their energy and support in helping to revitalize and recreate HICAHS over the past year. This newsletter provides an overview of some of our current research, education, and outreach efforts. We hope to do much more in the future, and welcome your questions, suggestions, and collaboration.

Sincerely,

Stephen J. Reynolds, Ph.D., CIH
Professor and Director of HICAHS

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HICAHS Highlight

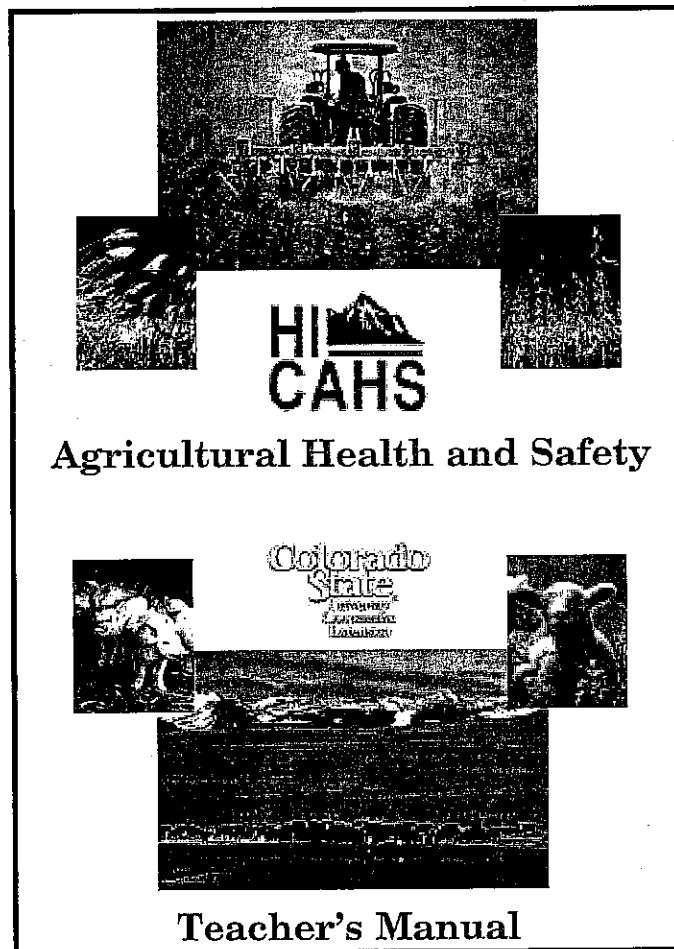
Agriculture Health and Safety Curriculum Evaluation

Principal Investigator: *Dr. Bob Seiz*

Co-Principal Investigator: *Dr. Vicky Buchan*

This exciting project is a 5-year, 2-state, longitudinal study that uses both quantitative and qualitative methodologies. It seeks to evaluate the impact of a new, community-based, technology-driven, agricultural health and safety curriculum on high school sophomores enrolled in agriculture classes in Colorado and Wyoming. Outcome variables investigate (1) the acquisition and retention of preventative knowledge in nine areas of identified risk, (2) the reduction of agriculture-related injuries and illnesses, and (3) the attainment of safety attitudes and behaviors.

Tailored to middle to senior high school students, school districts in Colorado and Wyoming with agriculture curricula were recruited for the study. Following stratification by size, participating school agriculture programs were randomly



assigned to the control and the experimental groups. The experimental programs implemented the curriculum while control programs continued to offer their usual program of studies. The curriculum was offered in handbook and interactive CD-ROM format.

The use of technology allows the incorporation of more visual imagery and provides a more interactive platform than most traditional curricula available. Teachers randomly selected to teach the new curriculum received training on its background, its flexibility in use, and its delivery platform. All participating teachers received training on the research instruments and protocol.

Data is then collected from high school sophomores enrolled in agriculture classes at various points during the school year and again approximately one-and-a-half years following the implementation of the curriculum,

when the now sophomores will be seniors. Qualitative data is to be collected by in-depth interviews with randomly selected families of students who were taught the new curriculum. ■



Research Report

The following abstracts profile current HICAHS studies.

New Methods for Evaluation of Organic Dust Aerosols - Colorado Component

Primary Investigator: *Stephen J. Reynolds, Ph.D., CIH*

Cooperative Agreement Collaborator: *Daniel Lewis, Ph.D., NIOSH Health Effects Laboratory*

More than 700,000 men, women, and children working in livestock production are at risk for occupational lung disease related to organic dust exposures. The primary goals of this project are to: 1) evaluate a novel Recombinant Factor C endotoxin assay using organic dusts from livestock environments, 2) evaluate new methods for measuring inhalable particulates, endotoxins, and glucans/ergosterols that can be used to help establish occupational exposure guidelines for complex organic dusts in swine, poultry, dairy, equine and sheep environments, and 3) evaluate and develop correction factors for direct-reading aerosol instruments that can be readily used by practitioners for interventions. This project involves close collaboration with NIOSH, and with the University of Iowa's Great Plains Center for Agricultural Health, and will complement and enhance the related project conducted at that Center. The performance of inhalable including the IOM, IOM with Multifoam discs, and Button Sampler will be compared to traditional gravimetric methods under controlled laboratory

conditions and in the field. The utility and performance of these devices for measuring endotoxins and glucans/ergosterols will also be determined. Analysis using both assay and chemical methods will help elucidate relationships



between specific chemical components and potency of these bacterial and fungal products in the various organic dust matrices, ultimately providing better tools for epidemiologic studies and standard setting.

In the same laboratory and field experiments, two direct-reading devices, the DataRAM and HAM, will be compared to the gravimetric methods and their performance characterized in response to particle size distributions determined using a Grimm. Their suitability for

practical applications in these environments will also be determined. A unique aspect of this study will be the laboratory evaluation of sampler performance when influenced by wind, validating the work performed at Iowa under quiescent conditions. This project addresses the need for more research related to organic dusts in agriculture identified by the NIOSH Board of Scientific Counselors as well as developing practical cost-effective tools for application in engineering and other interventions, also identified as a priority. This study will address several priority areas of the National Occupational Research Agenda (NORA):

Asthma and Chronic Obstructive Pulmonary Disease, Mixed Exposures, and Exposure Assessment Methods. This project also addresses the NIOSH Agricultural Center's priority area to develop and conduct research related to the prevention of occupational disease of agricultural workers and their families, with an emphasis on multi-disciplinary research and the development and evaluation of control technologies. ■



Research Report

Odor Reduction Strategies in Colorado Feedyards

Investigators: *Dr. Tim L. Stanton, Mr. Bill Wailes, Dr. Stephen Reynolds, Dr. Jessica Davis*

Students: *Pablo Loza, Marc Cusanelli*

The purpose of the proposed study is to evaluate management strategies attempting to reduce odor, which can then be applied to worker safety and satisfaction.

First, a system must be established to measure odor objectively. Thus, the purchase of an electronic nose is proposed. The device consists of a sensor array and neural network, which can be "trained" to respond to complex odors. It is believed that this system best objectively measures odor, and can be "tuned"

for specific application and validation.

This proposed study would use a commercial feedyard in Weld County to evaluate pen surface modification with the following treatments: control, application of citric acid, and application of boric acid.

Acid application would be in an area of the pen 20' wide starting at the back of the feedbunk apron and extending into the pen 20' from fence to fence, since this area of the pen is generally highest in moisture

(which generates odor). The acid treatments are hypothesized to reduce pH and trap ammonia and other odorous compounds, thus reducing odor.

Treatments would be replicated (pen would be the experimental unit). Supplies and application costs will be solicited from the livestock operation. Acid application would be in the range of 2-5 lbs/100 sq ft depending on product selected. Odor would be monitored before and immediately after application to plot odor duration. ■

Site-Specific Management of Tractor Safety and Engineering Control Strategies Based on Tractor Stability

Primary Investigator: *Dr. Juhua Liu*

This pilot study seeks to assess a current tractor stability monitoring system designed for engineering control deployment strategies, and to develop the basic concept and framework of site-specific stability mapping and related technology for tractor operators. Additionally, it seeks to propose an advanced relevant measuring system and method of data processing. A site-specific operation safety management and stability mapping system is based on tractor safety and stability information, and will be developed utilizing the advanced



measuring system of tractor stability (MSTS), Differential Global Positioning System (DGPS), Geographic Information System (GIS), and Video Mapping System (VMS). A monitoring system of dynamic ROPS deflection and timing of tractor overturn will be developed by using LVDT (Linear Variable Differential Transformer) and MSTS, and applied to validate effectiveness of the protective structure deployment for engineering control strategies. Radio-controlled tractors and normal

tractors equipped with the stability monitoring system and field data acquisition will be used to conduct field tests and collect data.

The application of the stability monitoring system for the deployment of engineering control strategies, tractor stability mapping with management of agricultural machinery will be explored in various typical fields, including longitudinal and lateral overturns. The tractor stability maps can help operators and/or farmers determine precise requirements for driving, safety management, and other agricultural equipment operation for each traffic routine of the field. The framework of Weber-based information of agricultural machinery safety is proposed. ■



Research Report

Worker Safety Education: Current Status and Future Needs in the Colorado Dairy Industry

Principal Investigator: *David C. Van Metre, DVM, DACVIM*

Co-Investigators: *Franklyn B. Garry, DVM, MS, DACVIM; Helen Holmquist-Johnson, MSW; Stephen J. Reynolds, PhD, CIH; Lorann Stallones, PhD; William R. Wailes, Dairy Extension Specialist*

Research Training: *Master of Sciences, Clinical Sciences, Yvette N. Roman-Muñiz, DVM*

The agricultural industry remains one of the most dangerous industries for laborers in the United States. Agriculture currently ranks only second to mining in the incidence of fatal injury to workers, and the incidence of non-fatal injury in agriculture ranks third behind construction and manufacturing. Within the agricultural industry, injury and death result primarily from machinery use, with livestock incidents ranking second; however, in some regions, livestock are the primary sources of worker injury. Young age, minority status, and, in livestock production, work involving dairy cattle have been associated with a significantly increased risk of injury. Within the dairy industry, most injuries occur during milking cows or when treating cows for lameness. In a New York study, laborers sustained most injuries from being kicked, pushed, or fallen upon by dairy cows.

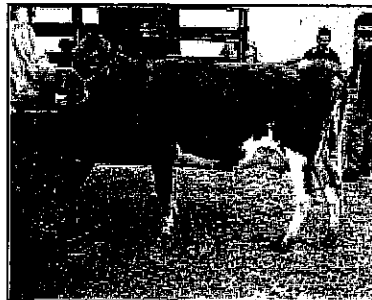
Currently, the labor force in US agriculture is comprised mainly of young Hispanic men, most of whom are foreign – born and speak Spanish as a primary language. Many of these farm workers do not have a farm background and use the agriculture sector as entry-level, often temporary employment. Familiarity with animal handling is highly variable

within this group of workers. Thus, the dairy industry in the



Western US is composed of a population of individuals at considerable risk of injury.

Dairy producers are increasingly aware of the costs of impaired worker health on the costs of operation, as well as health problems contributing to



the impermanence of the workforce on dairy operations. Colorado dairy producers have recently identified worker training as their primary need from university extension and outreach

programs. Specifically, producers need direction on development and implementation of worker training programs that integrate technical skills and worker safety – that is, job training to perform assigned tasks in a more skillful, effective, efficient, and safe manner. Similar needs have been identified for many other types of agricultural enterprises in the Western United States. However, outside of scattered testimonials, a directive is lacking from

the dairy industry regarding the specific skills and tasks upon which such a training program should focus. Furthermore, dairy workers and dairy owners may have different opinions regarding the specific objectives that such a training program should address.

The specific aims of this proposal are: 1) to identify factors in the workplace, including the quality of training in worker safety, that contribute to injury to workers on large Colorado dairies as perceived by the dairy workers and by management and 2) to compile the needs for training in specific tasks or skills for entry-level dairy workers on large Colorado dairies, as perceived by the dairy workers and by management. ■